Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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1-1. INTRODUCTION

This manual provides complete operating instructions and service information for the 8842A. If you want to get started using your 8842A right away, proceed to the operating instructions in Section 2. If you intend to use the 8842A with the IEEE-488 Interface (Option -05), read Sections 2 and 3. This meter has been designed and tested according to IEC publication 348, Safety Requirements for Electronic Measuring Apparatus. This manual contains information and warnings which must be followed to ensure safe operation and retain the meter in safe condition.

1-2. THE 8842A DIGITAL MULTIMETER

The Fluke 8842A Digital Multimeter is a high-performance 5-1/2 digit instrument designed for general-purpose bench or systems applications. The 8842A is the top-of-the-line DMM in the 8840A family. Using proprietary thin film resistor networks, a stable reference amplifier and stable active components, the 8842A offers superior measurement performance and stability. It also offers additional 20 mV, 20 ohm, and 200 mA dc ranges. Features of the 8842A include:

- Highly legible vacuum fluorescent display
- Intuitively easy front panel operation
- Basic dc accuracy of 0.003% for 1 year
- 2-wire and 4-wire resistance measurement
- DC current measurement
- Up to 100 readings per second
- Closed-case calibration (no internal adjustments)
- Built-in self-tests

1-3. OPTIONS AND ACCESSORIES

A number of options and accessories are available for the 8842A which can be easily installed at any time. The options include:

- IEEE-488 Interface (Option -05), featuring:
  - Full programmability
  - Simple and predictable command set
  - Fast measurement throughput
  - External Trigger input connector
  - Sample Complete output connector
  - Automated calibration
  - Low cost
- True RMS AC (Option -09), featuring:
  - AC voltage measurement
  - AC current measurement

Accessories include a variety of rack mounting kits, probes, test leads, and cables. Full information about options and accessories can be found in Section 8.

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1-4. SPECIFICATIONS

Specifications for the 8842A are given in Table 1-1. External dimensions are shown in Figure 1-1.

Table 1-1. Specifications

DC VOLTAGE
Input Characteristics

RANGE	FULL SCALE 5½ DIGITS	RESOLUTION		INPUT RESISTANCE
		5½ DIGITS	4½ DIGITS*	
20 mV	19.9999 mV	0.1µV	1 µV	≥10,000 MΩ
200 mV	199.999 mV	1µV	10 µV	≥10,000 MΩ
2V	1.99999V	10 µV	100 µV	≥10,000 MΩ
20V	19.9999V	100 µV	1 mV	≥10,000 MΩ
200V	199.999V	1 mV	10 mV	10 MΩ
1000V	1000.00V	10 mV	100 mV	10 MΩ
*4½ digits at the fastest reading rate.				

Accuracy

NORMAL (S) READING RATE ..... ±(% of Reading + Number of Counts)

RANGE	24 HOUR[1] 23±1°C	90 DAY 23±5°C	1 YEAR 23±5°C	2 YEAR 23±5°C
20 mV[2]	0.0050 + 20[3]	0.0070 + 30[3]	0.0100 + 30[3]	0.0120 + 40[3]
200 mV[2]	0.0030 + 2[4]	0.0045 + 3[4]	0.0070 + 3[4]	0.0100 + 4[4]
2V	0.0015 + 2	0.0025 + 2	0.0030 + 2	0.0050 + 3
20V	0.0015 + 2	0.0030 + 2	0.0035 + 2	0.0060 + 3
200V	0.0015 + 2	0.0030 + 2	0.0035 + 2	0.0060 + 3
1000V	0.0020 + 2	0.0035 + 2	0.0045 + 2	0.0070 + 3

1. Relative to calibration standards.
2. Within one hour of dc zero, using offset control.
3. When offset control is not used the number of counts are 50, 70, 90 and 90 for 24 hours, 90 day, 1 year, and 2 year respectively.
4. When offset control is not used the number of counts are 5, 7, 9 for 24 hours, 90 day, 1 year, and 2 year respectively.

MEDIUM AND FAST RATES: .....In medium rate, add 3 counts (20 counts on 20 mV Range) to number of counts. In fast rate, use 2 (4½ digit mode) counts (30 counts on 20 mV range) for the number of counts

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Operating Characteristics

TEMPERATURE COEFFICIENT .....<±(0.0006% of reading + 0.3 Count) per °C from 0°C to 18°C and 28°C to 50°C.

MAXIMUM INPUT.....1000V dc or peak ac on any range.

NOISE REJECTION.....Automatically optimized at power-up for 50, 60, or 400 Hz.

RATE	READINGS/ SECOND[1]	FILTER	NMRR[2]	PEAK NM SIGNAL	CMRR[3]
S[5]	2.5	Analog & Digital	>98 dB	20V or 2x FS[4]	>140 dB
M[6]	20	Digital	>45 dB	1x FS	>100 dB
F	100	None	_	1x FS	>60 dB

1. Reading rate with internal trigger and 60 Hz power line frequency. See “reading rates” for more detail.
2. Normal Mode Rejection Ratio, at 50 or 60 Hz ±0.1%. The NMRR for 400 Hz ±0.1% is 85 dB in S rate and 35 dB in M rate.
3. Common Mode Rejection Ratio at 50 or 60 Hz ±0.1%, with 1 kΩ in series with either lead. The CMRR is >140 dB at dc for all reading rates.
4. 20 volts or 2 times full scale whichever is greater, not to exceed 1000V.
5. Reading rate-1/3 rdg / sec. in the 20 mV, 20Ω, 200 mA dc ranges.
6. Reading rate-1.25 rdg / sec. in the 20 mV, 20Ω, 200 mA dc ranges.

TRUE RMS AC VOLTAGE (OPTION 8842A-09)

Input Characteristics

RANGE	FULL SCALE 5½ DIGITS	RESOLUTION		INPUT IMPENDANCE
		5½ DIGITS	4½ DIGITS*	
200 mV	199.999 mV	1 µV	10 µV	1 MΩ
2V	1.99999V	10 µV	100 µV	Shunted
20V	19.9999V	100 µV	1 mV	By
200V	199.999V	1 mV	10 mV	<100 pF
700V	700.00V	10 mV	100 mV	

*4½ digits at the fastest reading rate

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Accuracy

NORMAL (s) READING RATE ..... ±(% of Reading + Number of Counts).

For sinewave inputs ≥10,000 counts[1].

FREQUENCY	24 HOURS[2] 23±1°C	90 DAY 23±5°C	1 YEAR 23±5°C	2 YEARS ±5°C
20-45	1.2 + 100	1.2 + 100	1.2 + 100	1.2 + 100
45-200	0.3 + 100	0.35 + 100	0.4 + 100	0.5 + 100
200-20k				
(200 mV range)	0.06 + 100	0.08 + 100	0.10 + 100	0.20 + 100
(2V-200V range)	0.05 + 80	0.07 + 80	0.08 + 80	0.15 + 80
(700V range)	0.06 + 100	0.08 + 100	0.10 + 100	0.20 + 100
20k-50k	0.15 + 120	0.19 + 150	0.21 + 200	0.25 + 250
50k-100k	0.4 + 300	0.5 + 300	0.5 + 400	0.5 + 500

1. For sinewave inputs between 1,000 and 10,000 counts, add to number of counts 100 counts for frequencies 20 Hz to 20 kHz, 200 counts for 20 kHz, and 500 counts for 50 kHz to 100 kHz.

2. Relative to calibration standards.

MEDIUM AND FAST READING RATES.....In medium rate, add 50 counts to number of counts. In the fast rate the specifications apply for sinewave inputs ≥1000 (4½ digit mode) counts and >100 Hz.

NONSINUSOIDAL INPUTS .....For nonsinusoidal inputs ≥10,000 counts with frequency components ≥100 kHz, add the following % of reading to the accuracy specifications.

FUNDAMENTAL FREQUENCY	CREST FACTOR		
	1.0 TO 1.5	1.5 TO 2.0	2.0 TO 3.0
45 Hz to 20 kHz 20 Hz	0.05	0.15	0.3
20 Hz to 45 Hz and 20 kHz to 50 kHz	0.2	0.7	1.5

Operating Characteristics

MAXIMUM INPUT.....700V rms, 1000V peak or 2 x 10^7 Volts-Hertz product (whichever is less) for any range.

TEMPERATURE COEFFICIENT .....±(% of reading + Number of Counts) per °C, to 18°C and 28°C to 50°C.

FOR INPUTS	FREQUENCY IN HERTZ		
	20-20k	20k-50k	50k-100k
≥10,000 counts	0.019 + 9	0.021 + 9	0.027 + 10
≥1,000 counts	0.019 + 12	0.021 + 15	0.027 + 21

COMMON MODE REJECTION .....>60 dB at 50 or 60 Hz with 1 kΩ in either lead.

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CURRENT

Input Characteristics

RANGE	FULL SCALE 5½ DIGITS	RESOLUTION	
		5½ DIGITS	4½ DIGITS[1]
200 mA [2]	199.999 mA	1 µA	10 µA
2000 mA	1999.99 mA	10 µA	100 µA

1. 4½ digits at the fastest reading rate.
2. The 200mA range is available for dc current only.

DC Accuracy

NORMAL (S) READING RATE.....±(% of reading + number of counts).

RANGE	90 DAYS 23±5°C	1 YEAR 23±5°C	2 YEARS 23±5°C
200 mA	0.04 + 40	0.05 + 40	0.08 + 40
2000 mA			
≤1A	0.04 + 4	0.05 + 4	0.08+4
>1A	0.1 + 4	0.1 + 4	0.15+4

MEDIUM AND FAST READING RATES — In medium reading rate, add 2 counts (20 counts on 200 mA range) to number of counts. In fast reading rate, use 2 (4½ digit mode) counts (20 counts on 200 mA range) for number of counts.

AC Accuracy (Option –09)

NORMAL (S) READING RATE.....±(% of Reading + Number of Counts).

23±5°C, for sinewave inputs ≥10,000 counts[1].

	FREQUENCY IN HERTZ		
	20-45	45-100	100-5K*
ONE YEAR	2.0 + 200	0.5 + 200	0.4 + 200
TWO YEAR	3.0 + 300	0.7 + 300	0.6 + 300

*Typically 20 kHz

1. For sinewave inputs between 1,000 and 10,000 counts, add to number of counts 100 counts for frequencies 20 Hz to 5 kHz (typically 20 kHz).

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MEDIUM AND FAST READING RATES.....In medium rate, add 50 counts to number of counts. In fast reading rate, for sinewave inputs ≥1000 (4½ digit mode) counts and frequencies >100 Hz, the accuracy is ±(0.4% of reading +30 (4½ digit mode) counts).

NONSINUSOIDAL INPUTS .....For nonsinusoidal inputs ≥10,000 counts with frequency components ≤100 kHz, add the following % of reading to the accuracy specifications

FUNDAMENTAL FREQUENCY	CREST FACTOR		
	1.0 TO 1.5	1.5 TO 2.0	2.0 TO 3.0
45 HZ to 5 kHz	0.05	0.15	0.3
20 Hz to 45 Hz	0.2	0.7	1.5

Operating Characteristics

TEMPERATURE COEFFICIENT .....Less than 0.1 x accuracy specification per °C to 18°C and 28°C to 50°C.

MAXIMUM INPUT.....2A dc or rms ac. Protected with 2A, 250V fuse accessible at front panel, and interval 3A, 600V fuse.

BURDEN VOLTAGE.....1V dc or rms ac typical at full scale.

RESISTANCE

Input Characteristics

RANGE	FULL SCALE	RESOLUTION		CURRENT
	5½ DIGITS	5½ DIGITS	4½ DIGITS[1]	THROUGH UNKNOWN
20Ω[2]	19.999Ω	0.1 mΩ	1 mΩ	1 mA
200Ω	199.999Ω	1 mΩ	10 mΩ	1 mA
2 kΩ	1.99999 kΩ	10 mΩ	100 mΩ	1 mA
20 kΩ	19.9999 kΩ	100 mΩ	1Ω	100 µA
200 kΩ	199.999 kΩ	1Ω	10Ω	10 µA
2000 kΩ	1999.99 kΩ	10Ω	100Ω	5 µA
20 MΩ	19.9999 MΩ	100Ω	1 kΩ	0.5 µA

1. 4½ digits at the fastest reading rate.

2. Four-wire ohms only.

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Accuracy

NORMAL (S) READING RATE .....±(% of Reading + Number of Counts)[1].

RANGE	24 HOURS 23±1°C	90 DAY 23±5°C	1 YEAR 23±5°C	2 YEARS 23±1°C
20Ω[3]	0.007 + 30[4]	0.009 + 40[4]	0.012 + 40[4]	0.015 + 40[4]
200Ω[3]	0.0040 + 3[5]	0.007 + 4[5]	0.010 + 4[5]	0.012 + 4[5]
2 kΩ	0.0025 + 2	0.005 + 3	0.008 + 3	0.010 + 3
20 kΩ	0.0025 + 2	0.005 + 3	0.008 + 3	0.010 + 3
200 kΩ	0.0025 + 2	0.006 + 3	0.010 + 3	0.012 + 3
2000 kΩ	0.023 + 3	0.025 + 3	0.027 + 3	0.030 + 3
20 MΩ	0.023 + 3	0.040 + 4	0.042 + 4	0.050 + 4

1. Within one hour of ohms zero, using offset control.
2. Relative to calibration standards.
3. Applies to 4-wire ohms only.
4. When offset control is not used the number of counts are 50, 70, 90 and 90 for 24 hours,90 day, 1 year, and 2 year respectively.
5. When offset control is not used the number of counts are 5, 7, 9 and 9 for 24 hours, 90 day, 1 year, and 2 year respectively.

MEDIUM AND FAST READING RATES.....In medium rate, add 2 counts to the number of counts for the 200Ω through 200 kΩ ranges, 3 counts for the 2000 kΩ and 20 MΩ ranges, and 20 counts for the 20Ω range. In fast reading rate, use 3 (4½ digit mode) counts for the number of counts for the 200Ω range, 20 (4½ digit mode) counts for the 20Ω range and 2 (4½ digit mode) counts for all other ranges.

Operating Characteristics

TEMPERATURE COEFFICIENT .....Less than 0.1 x accuracy specification per °C from 0°C to 18°C and 28°C to 50°C.

MEASUREMENT CONFIGURATION .....2-wire or 4-wire in all ranges accept 20Ω range. Only 4-wire configuration is allowed in the 20Ω range.

OPEN CIRCUIT VOLTAGE .....Less than 6.5V on the 20Ω through the 200 kΩ ranges. Less than 13V on the 2000 kΩ and 20 MΩ ranges.

INPUT PROTECTION.....To 300V rms.

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Reading Rates

READING RATES WITH INTERNAL TRIGGER (readings per second)

RATE	POWER LINE FREQUECNCY[1]		
	50 Hz	60 Hz	400 Hz
S	2.08 (.26)[2]	2.5 (.31)[2]	2.38 (.30)[2]
M	16.7 (1.04)[2]	20 (1.25)[2]	19.0 (1.19)[2]
F	100	100	100

1. Sensed automatically at power-up.
2. In 20 mV, 20 ohm, and 200 mA DC ranges.

AUTORANGING

The 8842A autoranges up to the highest ranges in all funtions, down to the 200 mV range in the VDC and VAC funtions, and down to the 200 Ω ranges in the ohms funtions. To select the 20 mV dc, 20Ω, or 200 mA dc range, press the respective range button (or send the respective range command, if using the IEEE-488 option).

AUTOMATIC SETTLING TIME DELAY

Time in milliseconds from single trigger to start of A/D conversion, Autorange off.

FUNCTION	RANGE	READING RATE			NUMBER OF COUNTS FROM FINAL VALUE[1]
		S	M	F	
VDC	20 mV	342	342	9	30
	200 mV	342	61	9	5
	2V-1000V	342	17	9	9
VAC	All	551	551	551	30 (Note 2)
MA DC	200 mA	342	342	9	9
	2000 mA	342	17	9	5
MA AC	2000 mA	551	551	551	30 (Note 2)
Ohms	20Ω	395	395	17	40
	200Ω	395	106	17	5
	2 kΩ	322	17	13	5
	20 kΩ	342	17	13	5
	200 kΩ	141	121	21	5
	2000 kΩ	141	101	81	10
	20 MΩ	1020	964	723	10

1. Difference between first reading and final value for an in-range step change coincident with trigger. For slow reading rate. 50 counts for medium rate; 10 counts for fast rate.

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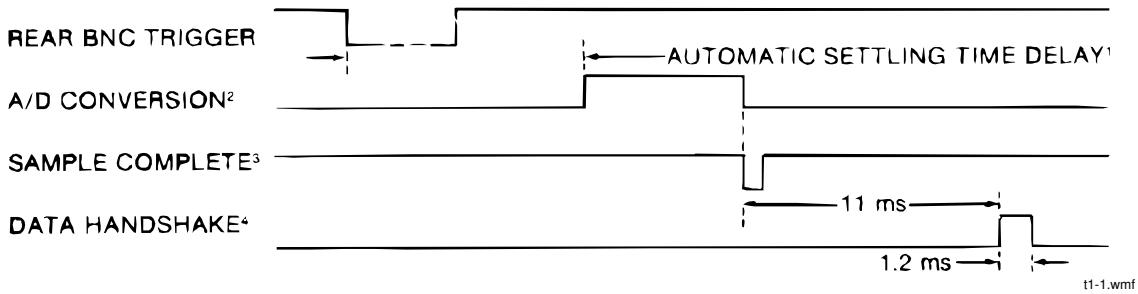
EXTERNAL TRIGGER TIMING CHARACTERISTICS

The following diagram shows the nominal timing for the various processes which take place between an external trigger and data sent out on the IEEE-488 interface. Delays will vary if a second trigger comes before the data handshake is complete.



NOTES:

1. Time for single trigger to start of A/D conversion.(See “Automatic Settling Time Delay” on previous page.) If the delay is disabled by using the T3 or T4 command, then the delay is 1 ms±150 µs. When the 8842A is triggered with an IEEE-488 command (GET or ?), the automatic settling time delay begins after the trigger command has been processed and recognized.
2. A/D conversion time is dependent on the reading rate and power-line frequency:

RATE	A/D CONVERSION TIME (ms)		
	50 Hz	60 Hz	400 Hz
S	472 (3800)*	395 (3195)*	414 (3300)*
M	52 (960)*	45 (795)*	47 (840)*
F	7	7	7
*In 20 mV DC, 20Ω and 200 mA DC ranges.			

3. Sample complete is a 2.5 µs pulse which indicates that the analog input may be changed for the next reading.
4. When talking to a fast controller.

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GENERAL

COMMON MODE VOLTAGE.....1000V dc or peak ac, or 700V rms ac from any input to earth.

TEMPREATURE RANGE .....0 to 50°C operating, -40 to 70°C storage.

HUMIDITY RANGE.....80% RH from 0 to 35ºC, 70% to 50°C.

WARMUP TIME.....1 hour to rated specifications.

POWER .....100, 120, 220, or 240V ac ±10% (250V ac maximum), switch selectable at rear panel. 50, 60, or 400 Hz, automatically sensed at power-up. 20 VA maximum.

VIBRATION.....Meets requirements of MIL-T- 28800C for Type III, Class 3, Style E equipment.

PROTECTION .....ANSI C39.5 AND IEC 348, Class I.

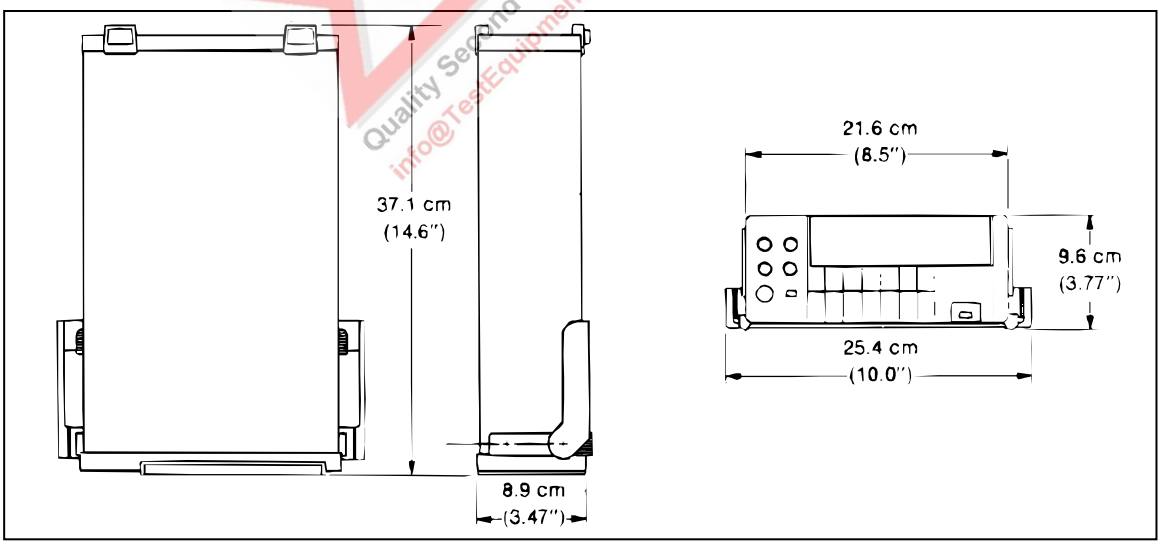
SIZE.....8.9 cm high, 21.6 cm wide, 37.1 cm deep(3.47 in high, 8.5 in wide, 14.6 in deep).

WEIGHT.....Net, 3.4 kg (7.5 lb); shipping, 5.0 kg (11 lb).

INCLUDED.....Line cord, test leads, Instruction/Service Manual, IEEE-488 Quick Reference Guide, (Option –05 only), and instrument performance record.

IEEE-488 INTERFACE FUNTION .....Option allows complete control and data output capability, and supports the following interface funtion subsets: SH1,AH1, T5, L4, SR1, RL1, DC1, DT1, E1, PP0, AND C0.

ELECTROMAGNETIC COMPATIBILITY Specifications apply when used in an environment with fields strengths ≤ 1 V/m, (0.8 V/m for DC Current.) For fields strengths up to 3 V/m, multiply floor adder by 12 for VDC and Resistance and 200 for DC current. VAC and AC Current have no adders up to 3 V/m.



f1-01.wmf

Figure 1-1. External Dimensions